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Plantation Timber on the Island of Lanai-1966

Wesley H. C. Wong, Jr.

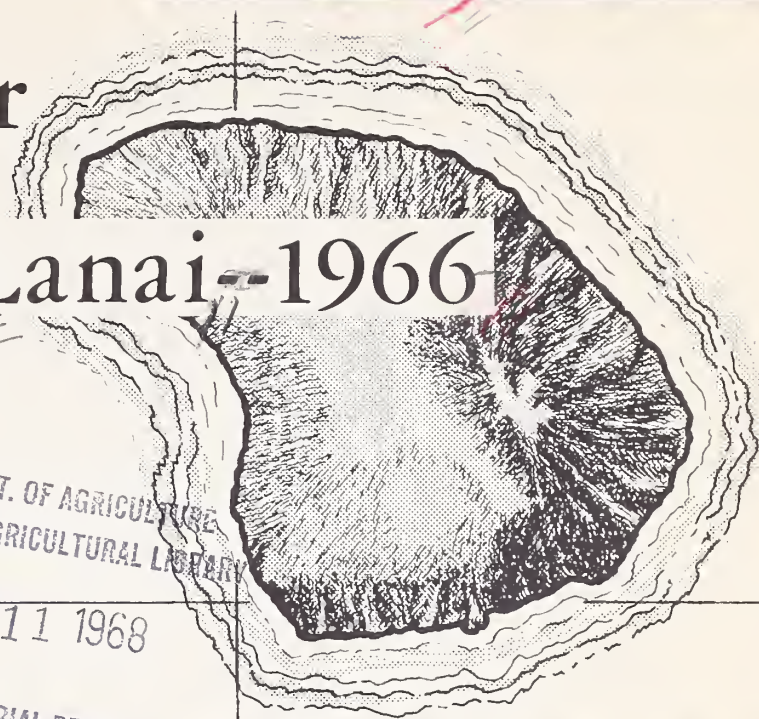
Nobuo Honda

Robert E. Nelson

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JUN 11 1968

CURRENT SERIAL RECORDS



2 U.S. Pacific Southwest Forest and Range
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Berkeley, California 94701

and

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Foreword

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This report is one of a series about planted timber on the major islands in the State of Hawaii. Reports for the islands of Hawaii (1965) and Kauai (1967) have been published. Summarized here are the results of an inventory of timber in planted forests on the island of Lanai. This inventory supplements the initial Forest Survey of the State completed in 1963. That survey indicated the importance of planted forests as a timber resource but provided no details. This bulletin reports: (a) location and acreage of each planted stand, (b) species composition and age, (c) timber volume and quality, and (d) ownership of planted timber.

The study is a cooperative undertaking of the Division of Forestry, Hawaii Department of Land and Natural Resources, and the Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture. It was conducted under the direction of Robert E. Nelson, in charge of the Station's forestry research in Hawaii. Nobuo Honda, forester, Hawaii Division of Forestry, helped develop plans for the plantation inventory and supervised the field work.

Many individuals aided in various phases of the survey. Special acknowledgment is due the field crew: Forester Wesley Wong, Jr., of the Hawaii Division of Forestry, assisted by William Kwon of the Hawaii Division of Fish and Game.

E. M. Hornibrook, retired, formerly in charge of Forest Survey at the Pacific Southwest Station, and Russell K. LeBarron, formerly forest ecologist, Hawaii Division of Forestry, aided in developing plans for the study.

Robert M. Miller, systems analyst, Pacific Southwest Station, developed specifications for processing the data by electronic computers. The Computing Center at the University of Hawaii processed the data.

Generous cooperation in the survey was provided by Floyd M. Cossitt, acting State forester (retired), Max F. Landgraf, State Forester (retired), and Karl H. Korte, district forester, and personnel of Dole Pineapple Company.

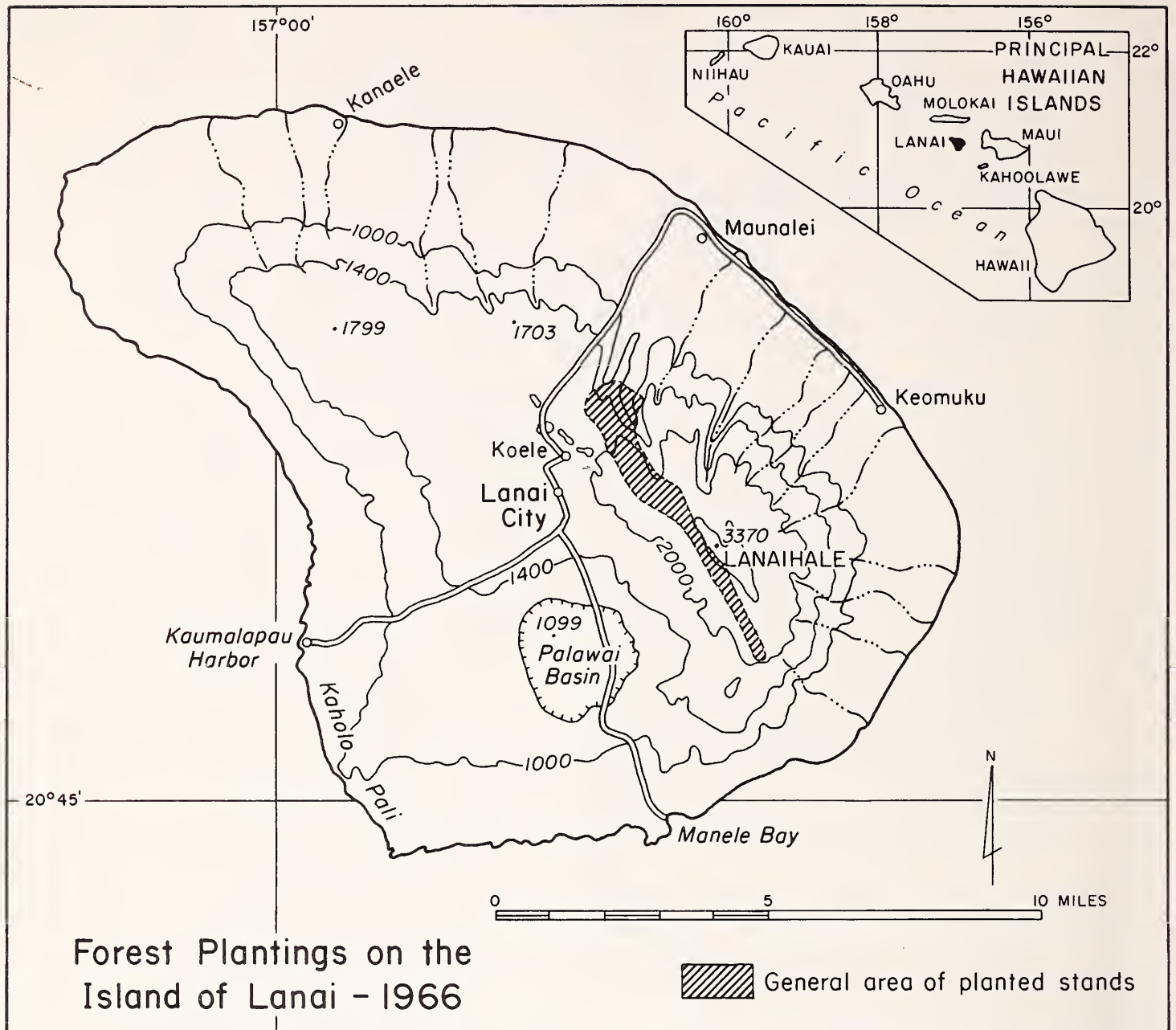
COVER PHOTO: *This Blackbutt Eucalyptus stand yields about 20,000 board feet per acre--the highest volume per acre on the Island of Lanai.*

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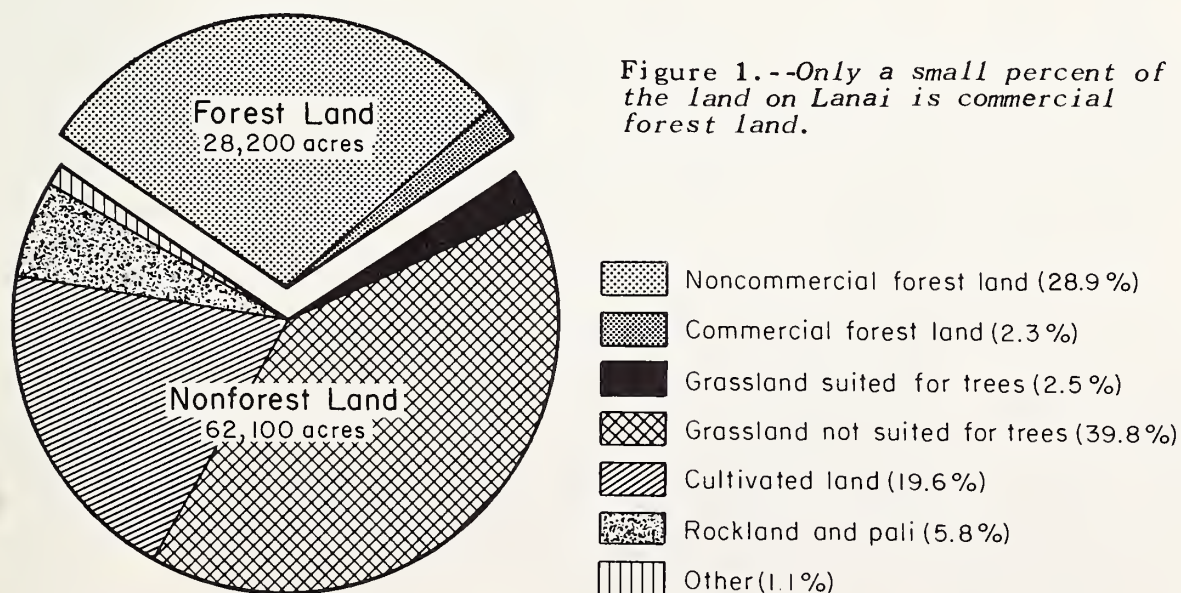


The Island of Lanai is one of the smaller islands in the Hawaiian chain. Located almost in the middle of the chain, it is 17 miles long and 13 miles wide. Of volcanic origin, the island rises rather steeply out of the ocean. Rugged topography marks the coastline, especially on the southern and western shores where sheer cliffs meet the sea. A large arable central plateau, or volcanic crater basin, lies at 1,500 to 2,000 feet elevation. This plateau is bounded on the east by rugged Lanaihale, which rises to 3,370 feet elevation.

Much of the land is arid, with annual rainfall ranging from less than 20 inches along the shoreline to about 40 inches at the summit of Lanaihale. Water is limited on Lanai. A critically important watershed is the central mountain--the only source of irrigation and domestic water.

There are large areas of grassland, usually sparsely covered, with much bare soil exposed most of the year (fig. 1). And the Island also has sizeable areas of barren eroded lands, rocklands, and steep pali.

Except for a few small parcels of land in houselots and government administrative sites, the total land area of 90,000 acres (641 square miles) is owned by the Dole Pineapple Company. Of this acreage, about 17,000 acres in the central plain are cultivated for pineapple production--the only significant commercial activity offering employment for residents on the island. Fishing, seasonal hunting, and tourist services offer additional but minor employment. There is no livestock industry on this island.



The first forest inventory in Hawaii showed that about 30 percent of the Island of Lanai--28,200 acres--is forest land¹ (fig. 1). But most of this amount--some 26,000 acres--is non-commercial forest land mainly in the lower, dry areas where kiawe (*Prosopis pallida*) and other brushy forest types predominate. Only about 2,000 acres are considered commercial forest land. They lie on the slopes of the central mountain where soils and rainfall can support timber growth. The native forests do not include sawtimber stands,² but some of the planted forests have developed into excellent timber stands.

No land is now in Forest Reserve status³ on Lanai. But from 1941 to 1957, the central mountain was a Forest Reserve.

Tree planting was started on Lanai more than 40 years ago by the Lanai Company, Ltd. for several purposes: windbreaks, fence posts, fuel, and watershed improvement. The latter was done mainly to prevent erosion, induce rainfall, and moderate runoff. Although the total acreage of forest plantings is small, some of the planted areas have developed into valuable forests for watershed protection, recreation, game habitat, and wood products. We have made a stand-by-stand inventory to obtain information about plantation forest acreage, species, timber volume, and quality. This report summarizes data compiled for each plantation stand.

Plantation Timber Resource

Area

Most forest planting on the Island of Lanai has been on the slopes of Lanaihale (see map). Commercial forest plantations⁴ total only about 400 acres in stands 2 acres and larger. Of this amount, about 325 acres are sawtimber stands (table 1), 70 acres are sapling and pole-size pine stands, and about 75 acres are non-commercial plantations.

Eucalypts make up more than 80 percent of the area of sawtimber stands (table 1). There are some 150 acres of robusta eucalyptus sawtimber stands, for this species was heavily favored in early plantings. Other hardwoods, such as molucca albizzia, tropical ash, and Australian redcedar, together with Norfolk-Island-pine, total less than 20 percent of the acreage of sawtimber stands.

¹Nelson, Robert E. and Wheeler, Philip R. *Forest Resources of Hawaii, 1961*. Forestry Div., Dep. Land and Nat. Res., State of Hawaii, in cooperation with the Pacific SW. Forest and Range Exp. Sta., Forest Serv., U.S. Dep. Agr. 48 pp., illus. 1963.

²About 50 acres of native *Acacia koa* are planted on commercial forest land. The trees are branchy and poorly formed. Many have dead branches and rotten trunks. Planted koa stands were not measured in this inventory.

³Public or private lands administered by the State for management and protection of watersheds and other forest values.

⁴See definitions of terms in Appendix.

The plantings of Monterey, loblolly, and slash pines established in the late 1950's and early 1960's have formed sapling and pole-size stands. However, these trees were planted at a wide spacing strictly for watershed improvement purposes and probably will not develop good sawtimber stands.

Timber Volume

The planted forests on Lanai contain 2.9 million board feet of sawtimber (table 3). Nearly 2.2 million board feet of this volume consists of eucalypts; the volume in robusta eucalyptus alone amounts to 1.7 million board feet. *Molucca albizzia* is the only other species of relatively large volume--about one-half million board feet. The combined volume in tropical ash, turpentine-tree, Australian redcedar, and Norfolk-Island-pine amounts to about one-quarter million board feet. About 80 percent of the sawtimber volume is in trees less than 19 inches d.b.h. (table 4). Generally, the trees on Lanai are smaller than trees on the other islands. Only a few stands have trees more than 100 feet tall.

The total growing stock volume in planted sawtimber stands is only about 800,000 cubic feet. About 77 percent of this volume is in eucalyptus species--more than half is robusta eucalyptus.

Poletimber and sapling stands contain additional growing stock volume, but these were not measured.

Wood in cull trees in the planted sawtimber stands totals nearly 40,000 cubic feet. The 75 acres of noncommercial plantations also hold a volume of wood in cull trees, but these ironwood, paper-bark, and Monterey cypress stands were not measured.

Age of Stands

Forestation was started later on Lanai than on the other islands. Most plantings were done in the 1920's and early 1930's (table 2). Therefore, nearly all the sawtimber stands are less than 40 years old. A small reforestation effort was resumed in the 1950's.

Stand Yields

The average yield of sawtimber in planted sawtimber stands on Lanai is just under 9,000 board feet per acre (table 6). But yields differ widely by stand age, species, site, history and condition of stand, and other factors. The highest yield was measured in a 30-year-old plantation of blackbutt eucalyptus. This 5-acre stand had a net average volume of 20,256 board feet per acre. Robusta eucalyptus stands averaged almost 11,000 board feet per acre.

Yields are lower on Lanai than the averages for the Islands of Kauai and Hawaii. This condition is probably due to poorer sites and younger age of stands on Lanai. Some of the Australian redcedar trees growing in well-drained narrow valley bottoms are, however, impressive. Turpentine-tree shows good growth. Tropical ash and robusta growth are not impressive.



Australian toon shows excellent form and growth in protected and well drained pockets.

Tropical ash and turpentine-tree (rough bark) grow well in valley bottoms on well-drained soil.



Robusta eucalyptus, generally a wet site species, does poorly on Lanai's drier sites.



Timber Quality

Molucca albizzia has the highest quality logs, as determined by standard hardwood log grades (table 5).⁵ The species has about 45 percent of its volume in grade 1 and 2 logs. Nearly 80 percent of the robusta eucalyptus volume is in grade 4 logs and only 5 percent in grade 1 and 2 logs. The quality of robusta eucalyptus timber on Lanai is inferior to that on the other islands.

Values of Forest Development

The small acreage of commercial forest land on Lanai has a relatively low productive capacity for timber. The potential for growing sawtimber is probably not much more than 500,000 board feet per year. This volume is not an adequate timber resource base to support a milling industry.

But the plantation forests are a source of wood products for local use: timbers, poles, posts, fuelwood, craftwood, and other products. Also, there are opportunities to produce even more for local use by managing forest plantations and reforesting additional lands.

Furthermore, timber and other wood products are not the only values to be gained from forest plantations. Their value for watershed cover and shelterbelts and for improved recreation and wildlife habitats will likely far exceed the value of any wood products harvested.

Forests on Lanai help control erosion caused by wind and water. Some of the forest plantings are considered to be extremely beneficial to watershed values on the slopes of Lanai-hale. Shelterbelts are needed on the central plateau, but species selection and establishment are difficult on these rigorous sites.

The existing forest plantations demonstrate that attractive outdoor recreation habitat can be developed. Planted stands, free from obstructing underbrush, are ideal for hiking, picnicking, camping, and bridle trails.

The forest areas on Lanai provide excellent game habitats. To improve the game resource, the Hawaii Fish and Game Division administers an active game management program. Some of the planted forests provide the best game habitat on the island.

Forestation can improve watershed, scenic, recreation, and wildlife values on many additional acres on Lanai. These benefits, singly or combined, may make forestation on large acreages of land a highly desirable goal. On this small, dry island, such a potential should not be overlooked.

⁵Quality of wood as determined by physical properties and mechanical characteristics inherent in species is not a consideration in this classification.



Ironwood species provide excellent shelterbelts for pineapple fields on this dry area.



Much of Lanai's lower areas are covered with scattered kiawe and grass. The Island's principal game habitat is found there.



Almost 6 percent of Lanai's land area is characterized by steep slopes and pali lands.

Forestry and game management officials assess the recreation potentials of a planted forest.



Recent plantings of loblolly, slash, and Monterey pines have been made for watershed protection.



Appendix

Definitions

Forest land: Land at least 10 percent stocked by forest trees of any size, or formerly having such tree cover and not currently developed for other use; and land supporting shrubs, the crowns covering more than 50 percent of the ground.

Commercial forest land: Forest land that is producing or can produce crops of industrial wood (usually sawtimber) and is not withdrawn from timber use.

Noncommercial forest land: (a) *Productive-reserved* forest land withdrawn from timber use through statute or administrative regulation, and (b) *unproductive* forest land incapable of yielding crops of industrial wood because of adverse site conditions.

Forest plantation: Planted forests in which at least 10 percent of growing space is occupied by planted species (usually exotic), regardless of native species predominance.

Commercial forest plantation: A plantation of commercial tree species on commercial forest land.

Noncommercial forest plantation: A plantation of noncommercial tree species or of commercial tree species planted on noncommercial forest land.

Commercial tree species: Tree species suitable for industrial wood products. Species suited only for fuelwood or fence posts are excluded. The following species are in the planted stands:

<i>Scientific Name</i>	<i>Common Name</i>
<i>Acacia koa</i>	koa
<i>Albizia falcata</i>	Molucca albizzia
<i>Araucaria excelsa</i>	Norfolk-Island-pine
<i>Eucalyptus botryoides</i>	bangalay eucalyptus
<i>Eucalyptus pilularis</i>	blackbutt eucalyptus
<i>Eucalyptus robusta</i>	robusta eucalyptus
<i>Eucalyptus saligna</i>	saligna eucalyptus
<i>Eucalyptus sideroxylon</i>	red-ironbark eucalyptus
<i>Eucalyptus spp.</i>	unidentified eucalyptus
<i>Fraxinus uhdei</i>	tropical ash
<i>Grevillea robusta</i>	silk-oak
<i>Pinus elliottii</i>	slash pine
<i>Pinus radiata</i>	Monterey pine
<i>Pinus taeda</i>	loblolly pine
<i>Syncarpia glomulifera</i>	turpentine-tree
<i>Toona ciliata</i> var. <i>australis</i>	Australian redcedar (toon)

Noncommercial tree species: Tree species not now considered suitable for industrial products. The following species are in the planted stands:

<i>Scientific Name</i>	<i>Common Name</i>
<i>Casuarina</i> spp.	ironwoods
<i>Cupressus macrocarpa</i>	Monterey cypress
<i>Eucalyptus globulus</i>	bluegum eucalyptus
<i>Melaleuca leucadendron</i>	paper-bark

Hardwoods: Dicotyledonous trees; usually broadleaved:

Softwoods: Coniferous trees, usually evergreen, having needle or scale-like leaves.

Forest types: Planted forests which are predominantly of a single species and in which no other species makes up 25 percent or more of the stand, are designated by the single species such as robusta eucalyptus type or tropical ash type. Otherwise they are designated:

Commercial eucalyptus type: Planted stands predominantly of eucalyptus species, in which other hardwoods or conifers comprise less than 25 percent of the stand.

Commercial hardwood type: Planted stands predominantly of hardwoods other than the eucalypts in which conifers or eucalypts comprise less than 25 percent of the stand.

Commercial conifer type: Planted forests predominantly of conifers (e.g. Norfolk-Island-pine, sugi, pines, and redwood) in which eucalypts or other hardwoods comprise less than 25 percent of the stand.

Class of Timber

Growing stock: Live trees of good form and vigor and of species suited for industrial wood (commercial species).

Sawtimber trees: Live trees of commercial species of at least 11.0 inches diameter breast height which contain a butt half-log or a log which meets the specifications of standard lumber, or tie and timber log grades.

Poletimber trees: Live trees of commercial species between 5.0 and 10.9 inches d.b.h., having soundness and form necessary to develop into sawtimber trees.

Saplings and seedlings: Live trees of commercial species between 1.0 and 4.9 inches d.b.h. and less than 1 inch, respectively, which show promise of becoming sawtimber trees.

Sound cull trees: Live trees 1 inch d.b.h. or larger which do not qualify as growing stock because of species (noncommercial species), poor form, or excessive limbs.

Rotten cull trees: Live trees 1 inch d.b.h. or larger which are not growing stock or sound cull because of excessive rot.

Sawtimber: Wood in trees defined as sawtimber trees.

Volume

International 1/4-inch kerf log rule: A formula rule for estimating the board-foot volume of logs, by 4-foot log sections, V equals $0.905 (0.22D^2 - 0.71D)$.

Sawtimber volume: The net volume of the saw-log portion of sawtimber trees, in board feet, International 1/4-inch rule.

Saw-log portion: That part of the main bole of sawtimber trees between the stump and the merchantable top.

Merchantable top: The point on the bole above which a merchantable sawlog cannot be obtained; i.e., the point where the main stem divides into limbs or is less than 8 inches diameter inside bark.

Growing stock volume: Volume in cubic feet of sound wood in the bole of sawtimber and poletimber trees from stump to a minimum top diameter inside bark (d.i.b.) of 4.0 inches, or to the point where the main stem divides into limbs.

All timber volume: Volume in cubic feet of sound wood in the bole of growing stock and cull trees 5.0 inches d.b.h. or larger, from stump to a minimum top diameter inside bark (d.i.b.) of 4.0 inches.

Stand-Size Class

Sawtimber stands: Stands at least 10 percent stocked with growing-stock trees, half or more in sawtimber and poletimber trees, and sawtimber stocking at least equal to poletimber.

Poletimber stands: Stands failing to qualify as sawtimber but at least 10 percent stocked with growing stock trees, at least half poletimber.

Sapling and seedling stands: Stands not qualifying as sawtimber or poletimber, but at least 10 percent stocked with growing stock.

Nonstocked: Commercial forest lands less than 10 percent stocked with growing stock trees.

Miscellaneous

Diameter breast height (d.b.h.): Tree diameter in inches, outside bark, measured at 4-1/2 feet above the ground for normal trees, and 18 inches above the stilt or swell for abnormal trees.

Industrial wood: Commercial roundwood products, such as saw-logs, veneer logs, and pulpwood. Fuelwood and fence posts are excluded.

Log grades: A classification of logs based on external characteristics as indicators of quality or value. Grade 1 is the highest quality, grade 2 intermediate, and grade 3 the lowest quality of standard hardwood factory lumber logs.⁶ Grade 4 logs are suitable for ties and timbers.

Timber quality: Based on log grades unless stated otherwise. Characteristics of wood such as density, strength, color, and shrinkage, are also measures of quality. However, these are usually inherent in a species.

Inventory Procedure

Area and volume statistics presented in this report were developed plantation stand by plantation stand. First, individual forest plantations of 2 acres or more were identified and delineated on aerial photographs through stereoscopic study. Each plantation was given a stand number and classified as to type and stand-size group. The area of each plantation was measured on the photograph. Ownership and stand age were determined from maps and other records. Field examination of each plantation allowed for correcting delineations, classifications, and acreages.

Next, timber-volume plots were located on the ground in each commercial forest plantation of 5 acres and larger having saw-timber trees. The sample plot locations were selected at random from a grid of points overlaid on the aerial photograph. Two or more sample locations, depending on stand acreage and variability, were selected in each stand. At each location, tree measurements were made from which timber volume and quality could be computed and expanded. Detailed measurements were made on a "main" plot at each location, supplemented by additional but less detailed data on two "satellite" plots. All plots were variable plots with a basal area factor of 20.

Finally, the data were processed through a specially prepared electronic computer program. Tree measurements were converted to meaningful volume units on a per-acre basis, averaged for the plots in a stand, and expanded for the acreages of the stand. The computer output consisted of tabular data for each stand and a summary of stand data. Volumetric data for stands 2 to 4 acres in size were extrapolated from closely similar measured stands.

The accuracy goal for this inventory was ± 20 percent per 5 million net board feet of sawtimber in a stand, at the level of one standard error. Calculations show that the reliability of the estimate of total sawtimber in measured stands is ± 6 percent two chances out of three.

⁶U.S. Forest Products Laboratory. *Hardwood log grades for standard lumber --proposals and results.* U.S. Forest Serv. Forest Prod. Lab. Rep. 1737, 15 pp., illus. 1953.

Table 1.--Area of forest plantations by forest type and stand-size class,
Island of Lanai, 1966

Forest type	Stand-size class				Total
	Seedling & :		Non- :		
	: sapling	: Poletimber	: Sawtimber	: commercial	
	----- Acres -----				
Commercial types					
Robusta eucalyptus	--	--	153	--	153
Blackbutt eucalyptus	--	--	12	--	12
Other eucalypts ^{1/}	--	--	97	--	97
Molucca albizzia	--	--	21	--	21
Tropical ash	--	--	19	--	19
Turpentine-tree	--	--	4	--	4
Australian redcedar	--	--	3	--	3
Mixed hardwoods ^{2/}	--	--	15	--	15
Norfolk-Island-pine	--	--	3	--	3
Pine	70	--	--	--	70
Total	70	--	327	--	397
Noncommercial types					
Ironwood	--	--	--	35	35
Monterey cypress	--	--	--	40	40
Total	--	--	--	75	75
Total all types	70	--	327	75	472

^{1/} Includes bangalay, saligna, red-ironbark, and unidentified eucalyptus.

^{2/} Includes combination of the listed species.

Table 2.--Area of forest plantations by forest type and period planted,
Island of Lanai, 1966

Forest type	Period of planting					Total
	1926-1935 :	1936-1945 :	1946-1955 :	1956-1965 :		
	----- Acres -----					
Commercial types						
Robusta eucalyptus	107	46	--	--		153
Blackbutt eucalyptus	4	8	--	--		12
Other eucalypts ^{1/}	--	97	--	--		97
Molucca albizzia	14	7	--	--		21
Tropical ash	--	19	--	--		19
Turpentine-tree	--	4	--	--		4
Australian redcedar	--	3	--	--		3
Mixed hardwoods ^{2/}	--	15	--	--		15
Norfolk-Island-pine	3	--	--	--		3
Pine	--	--	--	70		70
Total	128	199	--	70		397
Noncommercial types						
Ironwood	4	31	--	--		35
Monterey cypress	--	37	3	--		40
Total	4	68	3	--		75
Total all types	132	267	3	70		472

^{1/} Includes bangalay, saligna, red-ironbark, and unidentified eucalyptus.

^{2/} Includes combination of the listed species.

Table 3.--Volume of growing stock, sawtimber, and cull trees
by species, in planted sawtimber stands,
Island of Lanai, 1966

Species	: Growing : stock : <u>Thousand</u> : <u>cubic feet</u>	: Sawtimber : <u>Thousand</u> : <u>board feet</u>	: Cull trees : <u>Cubic</u> : <u>feet</u>
Robusta eucalyptus	450	1,672	19,262
Blackbutt eucalyptus	105	243	970
Other eucalypts	71	235	3,827
Molucca albizzia ^{1/}	99	525	--
Tropical ash	47	108	3,670
Turpentine-tree	13	38	234
Australian redcedar	17	57	1,426
Other hardwoods ^{2/}	--	--	1,680
Norfolk-Island-pine	9	42	--
Noncommercial species ^{3/}	--	--	6,378
Total	811	2,920	37,447

^{1/} No Molucca albizzia stands were large enough to be cruised, but log volumes of similar measured stands on Kauai were used here.

^{2/} Includes silk-oak and koa.

^{3/} Includes Casuarina spp. and bluegum eucalyptus.

Table 4.--Volume of sawtimber and growing stock in planted sawtimber stands
by species and diameter class, Island of Lanai, 1966

Species group	Tree diameter class (inches at breast height)										
	All	5.0-	11.0-	13.0-	15.0-	17.0-	19.0-	21.0-	23.0-	25.0-	27.0-
	classes	10.9	12.9	14.9	16.9	18.9	20.9	22.9	24.9	26.9	28.9
Thousand board feet ^{1/}											
Australian redcedar	57	--	17	10	24	6	--	--	--	--	--
Blackbutt eucalyptus	243	--	45	88	34	36	40	--	--	--	--
Bangalay eucalyptus	17	--	--	--	--	5	--	--	--	--	12
Eucalyptus spp.	138	--	33	34	38	24	9	--	--	--	--
Molucca albizzia ^{2/}	525	--	11	63	63	104	280	4	--	--	--
Norfolk-Island-pine	42	--	--	--	15	27	--	--	--	--	--
Red-ironbark eucalyptus	80	--	16	30	13	13	8	--	--	--	--
Robusta eucalyptus	1,672	--	285	414	508	235	230	--	--	--	--
Tropical ash	108	--	45	31	24	8	--	--	--	--	--
Turpentine-tree	38	--	2	2	22	9	3	--	--	--	--
Total	2,920	--	454	672	741	467	570	16	--	--	--
Species group	Thousand cubic feet										
	All	5.0-	11.0-	13.0-	15.0-	17.0-	19.0-	21.0-	23.0-	25.0-	27.0-
	classes	10.9	12.9	14.9	16.9	18.9	20.9	22.9	24.9	26.9	28.9
Australian redcedar	17	5	5	2	4	1	--	--	--	--	--
Blackbutt eucalyptus	105	5	30	41	15	8	4	--	--	--	--
Bangalay eucalyptus	3	--	--	--	--	1	--	--	--	--	--
Eucalyptus spp.	42	3	12	12	8	5	2	--	--	--	--
Molucca albizzia ^{2/}	99	7	7	14	14	18	38	1	--	--	--
Norfolk-Island-pine	9	--	--	--	4	5	--	--	--	--	--
Red-ironbark eucalyptus	26	7	5	7	3	2	2	--	--	--	--
Robusta eucalyptus	450	59	102	98	102	47	42	--	--	--	--
Saligna eucalyptus	(3/)	--	--	--	--	--	--	--	--	--	--
Tropical ash	47	14	15	10	7	1	--	--	--	--	--
Turpentine-tree	13	1	2	2	5	2	1	--	--	--	--
Total	811	101	178	186	162	90	89	5	--	--	--

^{1/} International 1 1/4-inch rule.

^{2/} Diameter classes applied to this species were derived from similar sawtimber-size stands of this species on Kauai.

^{3/} Less than a thousand cubic feet.

Table 5.--Sawtimber volume in planted sawtimber stands
by species groups and log grade^{1/}
Island of Lanai, 1966

Species group	: : All : : grades : Grade 1 : Grade 2 : Grade 3 : Grade 4 : 2/	: : Factory lumber grades : : timber logs: species	: Tie and : Softwood
	-----	Thousand board feet ^{3/} -----	
Robusta eucalyptus	1,672	11 66 273	1,322 --
Other eucalypts ^{4/}	516	13 15 54	434 --
Molucca albizzia ^{5/}	525	164 73 125	163 --
Tropical ash	108	-- 3 25	80 --
Australian redcedar	57	-- -- 12	45 --
Norfolk-Island-pine	42	-- -- --	-- 42
Total	2,920	188 157 489	2,044 42

^{1/} Based on standard specifications for hardwood log grades for standard lumber.

^{2/} Commercial conifer species are not log graded.

^{3/} International 1/4-inch rule.

^{4/} Mainly *Eucalyptus* spp. but includes turpentine-tree.

^{5/} No *Molucca albizzia* stands were cruised on Lanai, but log grades of similar measured stands on Kauai were used here.

Table 6.--Listing of individual stands and plantings with
species type, area, and volume,
Island of Lanai, 1966

Stand no. ^{1/} :	Species type	Acres	Total stand volume <u>Thousand board feet</u>
5001	Ironwood	12	(2/)
5002	Robusta eucalyptus	4	66
5003	Mixed eucalyptus	41	363
5004	Robusta eucalyptus	10	36
5005	" "	10	16
5006	Turpentine-tree	4	4
5007	Mixed species	11	145
5008	Pine	3	(3/)
5009	Robusta eucalyptus	9	8
5010	" "	2	2
5011	Robusta eucalyptus	10	51
5012	Monterey cypress	3	(2/)
5013	Robusta eucalyptus	4	68
5014	Mixed eucalyptus	26	73
5015	Monterey cypress	2	(2/)
5016	Robusta eucalyptus	3	50
5017	Ironwood	2	(2/)
5018	Robusta eucalyptus	4	66
5019	Ironwood	4	(2/)
5020	Mixed eucalyptus	2	41
5021	Blackbutt eucalyptus	3	61
5022	Robusta eucalyptus	6	99
5023	" "	13	221
5024	" "	2	33
5025	" "	2	34
5026	Robusta eucalyptus	3	50
5027	" "	3	50
5028	" "	2	33
5029	" "	3	50
5030	Norfolk-Island-pine	3	8

^{1/} These numbers identify specific stands delineated on aerial photographs which were used to make this inventory.

^{2/} Noncommercial plantation type.

^{3/} Poletimber or seedling and sapling stands.

Table 6, continued

Stand no.	Species type	Acres	Total stand volume <u>Thousand board feet</u>
5031	Robusta eucalyptus	2	33
5032	" "	2	33
5033	Pine	29	(3/)
5034	"	38	(3/)
5035	Robusta eucalyptus	8	75
5036	Ironwood	4	(2/)
5037	Mixed eucalyptus	8	31
5038	" "	20	42
5039	Robusta eucalyptus	23	66
5040	" "	18	29
5041	Australian redcedar	3	39
5042	Tropical ash	2	3
5043	" "	6	10
5044	" "	5	28
5045	Blackbutt eucalyptus	5	101
5046	Monterey cypress	35	(2/)
5047	Molucca albizzia	4	89
5048	Mixed species	4	53
5049	Molucca albizzia	3	67
5050	Ironwood	9	(2/)
5051	Molucca albizzia	4	89
5052	Ironwood	4	(2/)
5053	Robusta eucalyptus	4	66
5054	Tropical ash	2	11
5055	Robusta eucalyptus	4	68
5056	Molucca albizzia	3	67
5057	" "	4	89
5058	Robusta eucalyptus	2	33
5059	Blackbutt eucalyptus	4	81
5060	Molucca albizzia	3	67
5061	Tropical ash	4	22
Total Forest Plantation		472	2,920

